

A REVIEW ON ZERO EMISSIONS VEHICLES

Shubham Sawant and Deep Prajapati

Department of Mechanical Engineering, U.G Student, University of Mumbai,
Lokmanaya Tilak College of Engineering, Navi Mumbai, India

ABSTRACT

The paper presents the emerging technologies in automobile sector know as (ZEV) zero emissions vehicles. It describes the need and concept used in zero emission cars. How ZEV can be used as alternative method against traditional emission cars. It consists of electric cars, hydrogen cars and hybrid cars. The types of ZEV cars and the manufacturer of such ZEV cars are been describe in these paper. It describes the overall effect of this emerging technology on the automobile sectors.

Key words: ZEV, hydrogen cars, hybrid cars, emerging technology, automobile

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1. INTRODUCTION

The paper presents review of (ZEV) zero emission vehicles. It was first develop by California board of air resource (CBAR). The concept was develop to gain an alternative energy source against energy produce from petroleum fuels to provide large supply of energy also to reduce the effect of petroleum product on the environment that is the effect of global warming. The emission of zero pollutant from the vehicle. These vehicles do not emit pollutant from exhaust pipe while operating the vehicle. The energy produce to operate such vehicles may cause emission of pollutants. The traditional car operates on the petroleum fuels and produce harmful pollutants at exhaust like soot, carbon-monoxide, ozone, lead and oxides of nitrogen. To avoid such harmful emission the zero emission concepts had been developed.

2. ZERO EMISSION VEHICLES

The zero emission vehicle may be of muscle powered vehicle, electrical powered and hydrogen fuel cells. These cars are theoretically zero emission cars leaving muscle powered vehicles like gravity racer and bicycles. The electrical and hydrogen powered cars are caused emission but in safe form or while producing energy for operating. In Hydrogen cell cars the emission caused at exhaust is the water by combining of hydrogen and oxygen. In electrical car the energy required to generate electricity is caused from the power generator which cause emission. Other ZEV vehicle is hybrid cars it is a combination of the traditional IC engine and electrical charged the emission is caused when energy develop by IC engine and the electricity is develop from the wheels of the car these energy is used to run the electrical motor of the vehicle during these period of operating cause zero emission. In such way the emission is caused in actual by this vehicle but not in operating conditions. The emission

caused by these vehicles is very minute compare to convention vehicles. These vehicle are develop to create more amount of energy with les emissions.

Table 1 ZEV category vehicle chart

Zev category vehicle.		
Vehicle category	Vehicle type	Percentage of vehicles
Gold Pure (ZEV)	Hydrogen fuel cell Electric cars	2%
Silver Partial (ZEV)	Hybrid vehicle	2%
Bronze Initial (ZEV)	Ultra clean gasoline vehicle	6%

2.1. Electric Cars

The electrical cars work on the principle of energy generated from the rechargeable batteries to run a motor. The electrical energy is develop by the source is used to charged the battery. This battery runs the motor causing drive in the car. It gives high acceleration with quick torque also it is more efficient then IC engine. The number of operating components is less in electrical cars which cause the efficient operating of the car. The operating of such cars cause less noise as compared to IC engine operated cars. These cars are consider as zero emission cars because at exhaust there is no emission or zero tail pipe emission.

Working:-The electric car generates energy from lithium battery and these energy is use to give initial drive to the car after the initial drive given to the car the wheel rotate and the energy from the wheel is provided to the motor with the help of dynamometer these is then amplified by the controller and supply to battery pack in such way the battery is charged after the initial drive is complete. This process the charging of battery is carried at operating of car.

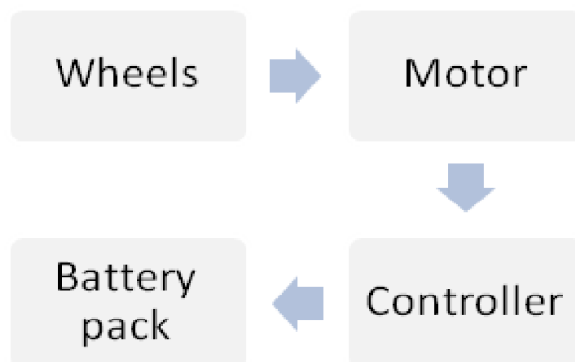


Figure 1 Flow chart of working of electric car.

Since, the crude oil is limited and cause green house effect .The use of electric cars can help to overcome the need of energy also the reduction in the pollution caused by harmful emission. These cars are costlier due to recharging infrastructure and low range of operation. But as the technology is an emerging one the cars may be at affordable range an easily available for everyone. By uses of this technology annually we can cause approx 20% of reduction in air pollution. Hence it is a beneficial technology and may help to develop efficient and safer.

2.2. Hydrogen Fuel Cars

In hydrogen fuel cars the hydrogen is used to generate the motion in vehicle. It works on the simple chemical process. It is the combination of the hydrogen fuel cells with the oxygen to emit electron to produce energy to drive the car. In these the energy may be develop by converting the chemical energy into mechanical energy either by burning hydrogen in IC engine or electrolysis process to generate electricity. The hydrogen is not available in the environment it is produced with the help of methane. The process of burning hydrogen in the IC engine may required some specialized form of IC engines these increase the initial cost of operating. The other process is the electrolysis process in which the hydrogen one atom is combined with the two oxygen atoms to form water and while combining the closed circuit produced electricity.

Working: - It works on polymer electron membrane. In these hydrogen is supplied to anode and oxygen to cathode. Hydrogen is split into positive and negative ions with the help of platinum catalyst. The negative ion closed the circuit and the positive ion combine with oxygen to form water. At the exhaust of the car water is emitted.

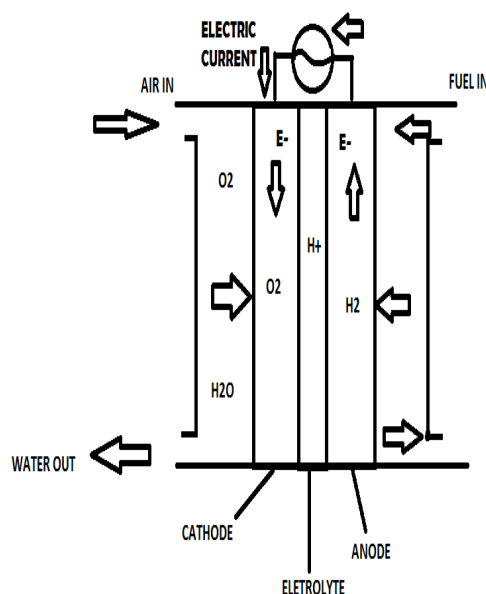


Figure 2 working of fuel cell car.

The technology is the costliest of all the ZEV due to production of the hydrogen and engine required to develop. This technology can bring a vast change in the automobile sector as the zero emission of harmful product and production of water can caused dual advantage to our environment. At present the cost of the car is high nut in upcoming year it would be the best solution to the traditional cars.

2.3. Hybrid Cars

The hybrid cars are the combination of the IC engine and the electrical motor. These are silver type of ZEV cars they caused partial emission of the pollutant at exhaust. The motion of vehicle is caused by IC engine which caused the vehicle to drive the rotation of wheel are used to generate electricity by use of dynamometer these electricity is used to charge the battery which further drives the motor. Thus it a dual type of operating engine. In short distance it use electrical power for long distance it use the traditional IC engine. These cars cause partial emission but better than traditional cars. It is affordable emerging technology at present and by further development these technology can be used as total zero emission.

Working: - In simple the hybrid cars work on the principle of power and torque required to operate. When we required high power and torque the engine works on gasoline engine and for the low power and torque it works on the electrical motor. These car initially use the gasoline engine and the required power is develop by car to the generator the generator provide energy to the energy splitter which provide energy to car and also charge the car battery for electrical power simultaneously.

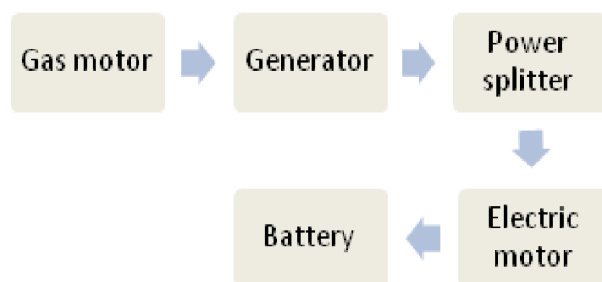


Figure 3 Flow chart of working of hybrid cars.

Since, Two system are combined it forms an hybrid power of electrical and gasoline power it gives same amount of input with less amount of emission of harmful exhaust gases. These types are cars are used in highly used in western countries. These technologies are widely applied in different countries of Asia.

3. MANUFACTURE OF THE ZEV

The manufacturing of these cars had been started from the year 2005 and these cars had a small market till year 2011. But after development of new programs and initiatives in these technologies the market for these cars had increased. In upcoming years the ZEV may have 30% of the market in the overall market. The lead manufactures of ZEV are Tesla in electric cars and HYUNDIA in hybrid cars.

These are some of the cars which are introduced in 2014 and 2015 in the market.

- Hyundai Tucson Fuel Cell
- BMW i3 (electrical)
- Chevrolet Spark EV(electrical)
- Toyota Mirai (hybrid)
- Nissan Leaf (electrical)
- Volkswagen e-Golf(hybrid)
- Tesla Model S(electrical)
- Fiat 500e(electrical)

4. CONCLUSION

From above three technologies which develop for zero emission cars we can say that the emission of harmful pollutant can be reduced and minimized. By reviews these three technologies we can say that further many more technologies can be develop to reduce the emission effect globally. Also further development in these technologies it can be made affordable for everyone as well as the growth of the technology. We can say that we can develop an environmental friendly automobile. Hence we can say

that these are the best emerging technology for automobile as well as a step towards safe environment with minimum air pollution.

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